CLAIMS

1. A linear motor actuator comprising:

a track rail having a stationary base portion and a pair of side wall portions extending upright from the stationary base portion, the track rail being formed in a channel-like configuration including a guide passage surrounded by the stationary base portion and the side wall portions, the side wall portions each being provided with a ball rolling groove facing the guide passage;

a table structure including a large number of balls that roll in the ball rolling groove, and an endless circulation passage in which the balls circulate, the table structure being mounted between the pair of side wall portions of the track rail through the balls to freely reciprocate within the guide passage;

a field magnet fixed to the track rail and having N poles and S poles alternately arranged along a longitudinal direction of the track rail; and

an armature mounted to the table structure such that the armature is opposed to the field magnet, the armature constituting a linear motor together with the field magnet and exerting on the table structure a propulsion force or a brake force acting in the longitudinal direction of the track rail,

the linear motor actuator being characterized in that:

the table structure includes: a pair of sliders each including

the endless circulation passage for the balls and moving forwards and backwards within the guide passage of the track rail; and a connecting top board connecting the sliders to each other with a predetermined interval between the sliders and provided with a mounting surface for a movable member;

the armature is located within the guide passage of the track rail while being fixed to the connecting top board at a position between the pair of sliders, the armature including an armature core of a comb tooth-like configuration and a coil, the armature core having a plurality of slots and teeth formed at a predetermined pitch along the longitudinal direction of the track rail, the coil being wound around each of the teeth of the armature core so as to fill in each of the slots; and

the field magnet is disposed at a position opposed to the armature core fixed to the connecting top board, with the stationary base portion of the track rail serving as a yoke of the field magnet.

2. A linear motor actuator according to Claim 1, characterized in that the armature is directly connected to the connecting top board, and that the sliders are fixed to the connecting top board through a heat insulating material.

3. A linear motor actuator according to Claim 1 or 2, characterized in that the connecting top board has a radiating fin

provided upright along a direction in which the table structure moves.

4. A linear motor actuator according to Claim 1, characterized in that a width of the field magnet in a direction perpendicular to the longitudinal direction of the track rail is the same as a width of the armature core in the same direction.

5. A linear motor actuator according to Claim 1, characterized in that the stationary base portion of the track rail has a recessed groove extending parallel to the ball rolling groove, the field magnet being fixed in the recessed groove.

6. A linear motor actuator according to Claim 1, characterized in that the sliders each have a recess formed in a surface opposed to the stationary base portion of the track rail, the recess having an opening width larger than a width of the field magnet.

7. A linear motor actuator according to Claim 1, characterized in that the sliders each have, in a surface opposed to the stationary base portion of the track rail, slots and teeth formed at a pitch equal to n (n is an integer) times a 1/4 cycle of an arrangement pitch λ of magnetic poles of the field magnet, the surface having a comb tooth-like configuration as a whole.

8. A linear motor actuator according to Claim 7, characterized in that fixing means for fixing the sliders to the connecting top board is capable of freely changing a fixing position of the sliders to the connecting top board along a direction in which the table structure moves.

9. A linear motor actuator according to Claim 1, characterized in that a distal end surface of the teeth of the armature core is formed in a curved configuration.

10. A linear motor actuator according to Claim 1, characterized in that with respect to a plurality of the field magnets arranged on the stationary base portion of the track rail, a boundary between adjacent ones of the field magnets is inclined by a predetermined degree relative to a lateral direction of the track rail.